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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/027,919	12/20/2001	Masaru Seita	51343	9973

7590

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EXAMINER

WONG, EDNA

ART UNIT	PAPER NUMBER
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1753

DATE MAILED: 03/11/2003

8

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/027,919

Applicant(s)

SEITA ET AL.

Examiner

Edna Wong

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). ____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4, 7. 6) ☐ Other:

Drawings

The subject matter of this application admits of illustration by a drawing (specification, page 4, lines 25-32) to facilitate understanding of the invention. Applicant is required to furnish a drawing under 37 CFR 1.81. No new matter may be introduced in the required drawing.

Specification

The disclosure is objected to because of the following informalities:

page 6, line 22, a -- , -- (comma) should be inserted after the word "atoms".

page 16, line 18, the word "uses" should be amended to the word -- used --.

page 18, line 10, the word "babbles" should be amended to the word -- bubbles -.

page 18, line 26, the words "the plating" (second occurrence) should be deleted.

Appropriate correction is required.

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the

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specification.

Claim Objections

Claims **7 and 10** are objected to because of the following informalities:

Claim 7

line 1, the word "method" should be amended to the word -- process --.

Claim 10

line 2, the word "the" (first occurrence) should be deleted.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

Claims **1-12** are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1

lines 1-6, the preamble of the claim recites "An electrolytic copper plating solution". However, the body of the claim does not recite any copper contained in the solution. Thus, the body of the claim is inconsistent with its preamble.

Claim 4

lines 4 and 5, the Markush group recites the words "or" and "and". It is unclear what species are in the alternative and what species are inclusive.

Claim 6

lines 1-2, the preamble of the claim recites "A process for electrolytic copper plating layer to a substrate". However, the body of the claim only recites the step of using the electrolytic copper plating solution. The step of using alone does not electroplate a copper plating layer.

Claim 10

lines 2-10, the preamble of the claim recites "A method for controlling an electrolytic copper plating solution". However, the body of the claim does not recite any copper contained in the solution. Thus, the body of the claim is inconsistent with its preamble.

line 8, it is unclear what "a thiol-reactive compound" is added to.

lines 8-9, "the concentration" lacks antecedent basis.

line 9, "the compound having -X-S⁻ structure" lacks antecedent basis.

Claim 12

line 5, the Markush group recites the words "or" and "and". It is unclear what species are in the alternative and what species are inclusive.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Product

I. Claim 9 is rejected under 35 U.S.C. 102(b) as being anticipated by **Sonnenberg et al.** (US Patent No. 5,252,196).

Sonnenberg teaches a composite material (= a copper clad plastic with copper filled conductive through holes) [col. 4, lines 37-57].

As to the limitation of "which is prepared by the process for electrolytic copper plating according to any one of claims 6 to 8", the invention defined in a product by process claim is a product, not a process. *In re Bridgeford* 679, 149 USPQ 55 (CCPA 1966).

It is the patentability of the product claimed and NOT of the recited process steps which must be established. *In re Brown* 459 F. 2d 531, 173 USPQ 685 (CCPA 1972); *In re Wertheim* 541 F. 2d 257, 191 USPQ 90 (CCPA 1976).

When the prior art discloses a product which reasonably appears to be either identical with or only slightly different than a product claim in a product-by-process claim, the burden is on the Applicants to present evidence from which the Examiner could reasonably conclude that the claimed product differs in kind from those of the prior art. *In re Brown* 459 F. 2d 531, 173 USPQ 685 (CCPA 1972); *In re Fessman* 489 F. 2d 742, 180 USPQ 685 (CCPA 1972) and MPEP § 2113.

Composition

II. Claims 1-4 are rejected under 35 U.S.C. 102(b) as being anticipated by **Kardos et al.** (US Patent No. 4,009,087).

Kardos teaches an electrolytic copper plating solution containing:

(a) a compound having the structure represented by the formula of -X-S-Y-, wherein each of X and Y independently represents an atom of carbon, in which X and Y may represent the same only in the case of a carbon atom (col. 1, lines 24-29; and cols. 12 and 13, Table II, esp., SAS Nos. 3-4, 9 and 12-13); and

(b) a thiol-reactive compound (= pyridine) [col. 1, lines 16-23; and col. 4, lines Table 1, esp., Cooperating Heteroamines No. 1].

The compound is $M-SO_3-(CH_2)_a-S-S-(CH_2)_b-SO_3-M$, wherein each of a and b represents an integer in the range of 3 to 8 and M represents an alkali element (= $NaO_3S(CH_2)_4-S-S-(CH_2)_4SO_3M$) [cols. 12 and 13, Table II, esp., SAS No. 3].

The electrolytic copper plating solution contains 0.1 to 100 mg/L of the compound

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having the structure represented by the formula -X-S-Y- (= 0.01 mg/l to 1000 mg/l) [col. 12, lines 40-45].

Process

III. Claims **6 and 7** are rejected under 35 U.S.C. 102(b) as being anticipated by **Kardos et al.** (US Patent No. 4,009,087).

Kardos teaches a process for electrolytic copper plating layer to a substrate comprising the steps of:

(a) using the electrolytic copper plating solution according to any one of claims 1 to 5 (col. 1, lines 12-29; and col. 17, lines 27-52).

The substrate is a printed wiring board (= printed circuit board) [col. 1, lines 33-35].

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

I. Claim **5** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Kardos et al.** (US Patent No. 4,009,087) as applied to claims 1-4 above.

Kardos is as applied above and incorporated herein.

Kardos does not teach wherein the thiol-reactive compound is present in the electrolytic copper plating solution in an amount from 1.0×10^{-4} to 1.0×10^{-1} mol/L.

However, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one skilled in the art would have been motivated to have modified the electrolytic copper plating solution of Kardos with wherein the thiol-reactive compound is present in the electrolytic copper plating solution in an amount from 1.0×10^{-4} to 1.0×10^{-1} mol/L because the concentration of the thiol-reactive compound is a result-effective variable and one skilled in the art has the skill to calculate the concentration that would determine the success of the desired reaction to occur, absent evidence to the contrary. MPEP § 2141.03 and § 2144.05(b).

Kardos teaches that the heteroamines may be present in the copper bath in effective amounts of 0.005 g/l to 40 g/l of total aqueous bath composition. The optimum concentration depends on the heteroamine and the sulfoalkyl sulfide chosen (col. 4, lines 18-25).

II. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Kardos et al.** (US Patent No. 4,009,087) as applied to claims 6 and 7 above, and further in view of **Sonnenberg et al.** (US Patent No. 5,252,196).

Kardos is as applied above and incorporated herein.

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Kardos does not teach wherein the substrate has a through hole or a via hole.

However, Sonnenberg teaches a process for electrolytic copper plating layer to a substrate using an electrolytic copper plating solution similar to Kardos'. The substrate is a printed circuit board containing through holes and the copper plating layer is formed on prepared conductive through hole walls using the electrolytic plating solution (col. 4, lines 37-67; and col. 8, line 9 to col. 9, line 33).

Thus, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one skilled in the art would have been motivated to have modified the process of Kardos with wherein the substrate has a through hole or a via hole because Kardos teaches copper plating printed circuit boards (col. 1, lines 33-35). It appears that the printed circuit boards taught by Kardos would have included printed circuit boards containing through holes because printed circuit boards containing through holes are well known in the art and electroplating copper onto prepared conductive through hole walls of printed circuit boards with an electrolytic copper plating solution as such is well known in the art as taught by Sonnenberg (col. 4, lines 37-67; and col. 8, line 9 to col. 9, line 33).

III. Claims **10-12** are rejected under 35 U.S.C. 102(b) as being anticipated by **Kardos et al.** (US Patent No. 4,009,087) in combination with **Sonnenberg et al.** (US

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Patent No. 5,252,196).

Kardos teaches a method comprising the step of:

(a) adding a thiol-reactive compound (= pyridine) [col. 1, lines 16-23; and col. 4, lines Table 1, esp., Cooperating Heteroamines No. 1] to an electrolytic copper plating solution containing:

a compound having the structure represented by the formula of $-X-S-Y-$, wherein each of X and Y independently represents an atom of carbon, in which X and Y may represent the same only in the case of a carbon atom (col. 1, lines 24-29; and cols. 12 and 13, Table II, esp., SAS Nos. 3-4, 9 and 12-13).

The compound is $M-SO_3-(CH_2)_a-S-S-(CH_2)_b-SO_3-M$, wherein each of a and b represents an integer in the range of 3 to 8 and M represents an alkali element (= $NaO_3S(CH_2)_4-S-S-(CH_2)_4SO_3M$) [cols. 12 and 13, Table II, esp., SAS No. 3].

The thiol-reactive compound is a heterocyclic compound (= pyridine) [col. 1, lines 16-23; and col. 4, lines Table 1, esp., Cooperating Heteroamines No. 1].

Kardos does not teach the step of maintaining the concentration of the compound having $-X-S^-$ structure equal or less than 1.0 micro mol/L.

However, Sonnenberg teaches that the species $HS-R-SO_3$ is the active form of a brightener that participates in electrolytic plating deposition at the substrate surface. Once present in a plating bath, the active species will react at a distance from the

cathode to form a dimer ($\text{O}_3\text{S-R-S-S-R-SO}_3$). It was found that copper plates of enhanced quality were provided if a brightening agent is employed in a plating solution where the brightening agent has a structure of the active species and the dimer (col. 8, line 41 to col. 10, line 2).

Thus, the invention as a whole would have been obvious to one having ordinary skill in the art at the time the invention was made because one skilled in the art would have been motivated to have modified the method of Kardos by maintaining the concentration of the compound having $-\text{X-S}^-$ structure equal or less than 1.0 micro mol/L because copper plates of enhanced quality were provided if a brightening agent is employed in a plating solution where the brightening agent has a structure of the active species (HS-R-SO_3) and the dimer ($\text{O}_3\text{S-R-S-S-R-SO}_3$) as taught by Sonnenberg (col. 8, line 41 to col. 10, line 2).

As to maintaining the concentration of the compound having $-\text{X-S}^-$ structure equal or less than 1.0 micro mol/L, the concentration of the compound having $-\text{X-S}^-$ structure is a result-effective variable and one skilled in the art has the skill to calculate the concentration that would determine the success of the desired reaction to occur, absent evidence to the contrary. MPEP § 2141.03 and § 2144.05(b).

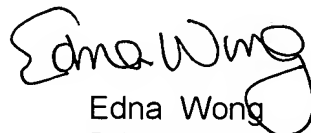
Sonnenberg teaches that the plating solution contains from about 1 ppb to 1 ppm of the active species (HS-R-SO_3) [col. 9, lines 46-68].

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Edna Wong whose telephone number is (703) 308-3818. The examiner can normally be reached on Mon-Fri 7:30 am to 5:00 pm, alt. Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (703) 308-3322. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 873-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1495.


Edna Wong
Primary Examiner
Art Unit 1753

EW
March 7, 2003